Date	FMV Document ID	Issue
2013-03-27	Appendix 4 to 10FMV6730-145:1	1.0
	Unit	Subject Code
	General Services Procurement Command	RFI
	Page	
	1 (41)	

SUBSYSTEM SPECIFICATION

FOR THE

EXERCISE CONTROL SYSTEM

OF THE

GUNNERY AND TACTICAL ENGAGEMENT TRAINING SYSTEM

DRAFT

Table of contents

1 Scope 3
1.1 Identification 3
1.2 System overview 3
1.3 Document overview 3
1.4 Use of terms 3
2 Referenced documents 4
3 Requirements 5
3.1 Required states and modes 5
3.2 System capability requirements 6
3.3 System external interface requirements 33
3.4 System internal interface requirements 35
3.5 System internal data requirements 36
3.6 Adaptation requirements 36
3.7 Safety requirements 36
3.8 Security and privacy requirements 36
3.9 System environment requirements 36
3.10 Computer resource requirements 36
3.11 System quality factors 37
3.12 Design and construction constraints 37
3.13 Personnel-related requirements 39
3.14 Training-related requirements 40
3.15 Logistics-related requirements 40
3.16 Other requirements 40
3.17 Packaging requirements 40
3.18 Precedence and criticality of requirements 41
4 Qualification provisions 41
5 Requirements traceability 41
6 Notes 41
6.1 Acronyms and abbreviations 41

DRAFT

1 Scope

1.1 Identification

INFO The Exercise Control System is a subsystem of the Gunnery and Tactical Engagement Training System, hereinafter referred to as 'GTETS'.

INFO This Specification applies to the Exercise Control System, hereinafter referred to as 'EXCON'.

INFO This Specification is one of several appendices to the System Specification for GTETS [1] where a complete overview of all documents describing the system can be found.

1.2 System overview

INFO See the System Specification [1].

1.3 Document overview

INFO See the System Specification [1].

1.3.1 Reader's guidance

INFO See the System Specification [1].

1.4 Use of terms

INFO See the System Specification [1].

DRAFT

2 Referenced documents

No	Document no	Title	Date	Source
1.	10FMV6730-145:1	System Specification for Gunnery and Tactical Engagement Training System, Version 1.0	2012	FMV
2.	STANAG 2019 App-6A	Military Symbols for Land Based Systems		NATO
3.	AFS 1998:5	Work with Display Screen Equipment	1998	Arbetsmiljöverket
4.	AFS 2000:42	Workplace Design	2000	Arbetsmiljöverket
5.	AFS 2005:16	Buller.	2005	Arbetsmiljöverket
6.	ProjMark 37 179:26336/00	Kapitel 8. Semitrailer.	2000	FMV

DRAFT

3 Requirements

INFO This section contains the system requirements that are applicable to EXCON.

3.1 Required states and modes

INFO See System Specification [1].

DRAFT

3.2 System capability requirements

3.2.1 Operational capability

INFO The capability of the Exercise Control System (EXCON) will be used by System Operators and Observer/Controllers for the purpose of controlling, monitoring, and evaluating exercises. EXCON capability will be scalable in order to provide operator positions suitable for different types of exercises and varying sizes of exercises. See Figure 1 for an overview of main equipment provided by EXCON.

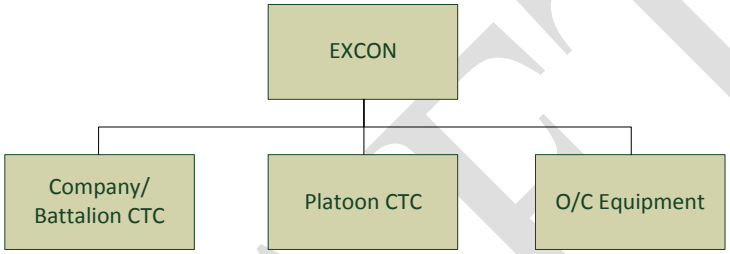

Figure 1. Overview of EXCON equipment.

3.2.1.1 Company and Battalion CTC

INFO Together with exercise communications system, each Company CTC will be used by System Operators to monitor, control and evaluate exercises ranging from platoon to company level. Company CTC will be deployed in the training area to provide an indoor work environment for System Operators.

ES-1. **Requirement**
Each Company CTC shall be installed in M5086-102011 PHV 9,7 STA/T trailer. See [6] for an overview of the semi-trailer.

ES-2. **Requirement**
EXCON shall provide the capability to monitor and control one (1) company size exercise from each Company CTC.

ES-3. **Requirement**
EXCON shall provide the capability to combine two Company CTC into one (1) Battalion CTC.

ES-4. **Requirement**
EXCON shall provide the capability to monitor and control one (1) battalion size exercise from one Battalion CTC.

DRAFT

ES-5. **Requirement**
EXCON shall provide the capability to monitor and control of up to and including four (4) separate and concurrent platoon size exercises from one (1) Company CTC.

ES-6. **Requirement**
EXCON shall provide one (1) operator position in each Company CTC that enables the System Operator to use the system monitoring capability as defined in this Specification in addition to the capability available in the ordinary operator positions.

ES-7. **Requirement**
EXCON shall provide ten (10) operator positions in each Company CTC that enable Observer/Controllers and System Operators to use exercise control, monitoring, and evaluation capability as defined in this Specification.

ES-8. **Requirement**
EXCON shall, at each operator position, provide a continuous visual display for the graphical user interface that can be controlled using a single set of input devices (mouse and keyboard) without any need for switching between input devices.

ES-9. **Requirement**
EXCON shall provide the screen size, resolution and display quality that enable the System Operator to simultaneous use the interactive map, menus, dialogs, status information, and other parts of the graphical user interface that are relevant to exercise control and monitoring (i.e. without the need for toggling between views or moving windows).

ES-10. **Requirement**
EXCON shall provide the capability to present audio and visual briefings and AAR at the Company CTC with at least three (3) different large screen views visible simultaneously to an audience of up to and including two hundred (200) people in an ‘ad hoc’ indoor environment (e.g. combat vehicle garage).

ES-11. **Requirement**
EXCON shall provide printing capability as defined in this Specification in each Company CTC.

DRAFT

3.2.1.2 Platoon CTC

INFO The main use will be to conduct small exercises, gunnery as well as tactical training exercises, but the Platoon CTC will also be used in combination with Company CTC during large exercises.

ES-12. **Requirement**
Platoon CTC shall be designed for control, monitoring and evaluation of small size tactical training exercises.

ES-13. **Requirement**
Platoon CTC shall be designed for control, monitoring and evaluation of small size gunnery training exercises.

ES-14. **Requirement**
EXCON shall enable one (1) Observer/Controller at each Platoon CTC to use the capability as defined in this Specification.

ES-15. **Requirement**
Platoon CTC shall provide the capability to present briefings and after action review to an audience of eight (8) people outdoors in an 'ad hoc' environment within the training area.

ES-16. **Requirement**
Platoon CTC shall provide the option to connect and use portable presentation equipment as defined in Paragraph 3.2.1.3.3 Portable presentation.

ES-17. **Requirement**
In GUNNERY TRAINING MODE, EXCON shall provide functions that enable individual Trainees to view the result of an engagement immediately after the engagement, including information about hit/miss and hit point on the target.

3.2.1.3 O/C Equipment

3.2.1.3.1 Portable CTC clients

INFO Portable CTC clients will be used by Observer/Controllers in order to monitor and control exercises from operator positions located in the exercise terrain, normally inside a vehicle.

ES-18. **Requirement**
Each Company CTC shall provide ten (10) Portable CTC clients that enables Observer/Controllers that are mobile in the exercise area to monitor and control

DRAFT

the exercise with the same functionality that is available at each operator position in the Company CTC.

3.2.1.3.2 Handheld CTC clients

INFO Handheld CTC clients will be used by Observer/Controllers in order to communicate via tactical communications that are monitored by Company CTC.

ES-19. **Requirement**
Each Company CTC shall provide ten (10) Handheld CTC clients that enable Observer/Controllers that are mobile on foot in the exercise area to communicate via the tactical communications networks that are monitored by the Company CTC.

3.2.1.3.3 Portable presentation

ES-20. **Requirement**
Each Company CTC shall provide portable presentation equipment that enable presentation of four (4) simultaneous and separate audio and visual briefings and AAR each to an audience of maximum thirty (30) people outdoors in the exercise area.

3.2.2 Engagement simulation capability

3.2.2.1 Laser engagement

ES-21. **Requirement**
EXCON shall be able to send control messages on whether FMV or OSAG 2.0 coding shall be used for a specific exercise over WAN and over PNAN.

ES-22. **Requirement**
EXCON shall enable Observer/Controllers to update the status of Players via optical interface in the field.

3.2.2.2 Non-laser engagement

ES-23. **Requirement**
EXCON shall be able to send fire records over WAN.

DRAFT

3.2.2.3 Weapon simulation

3.2.2.3.1 Indirect fire

ES-24. **Requirement**
EXCON shall provide simulated indirect fires, including realistic munitions effects, rate of fire, armament error, and trajectory profile for mortar and artillery.

ES-25. **Requirement**
EXCON shall determine the impact point for each simulated shell in a realistic way, taking the following parameters into account:
a) Trajectory profile
b) Armament error
c) Wind speed and direction
d) Air temperature
e) Air pressure

ES-26. **Requirement**
EXCON shall provide functions that enable System Operators to create simulated indirect fire units that can be used as shooters in the simulation.

ES-27. **Requirement**
EXCON shall provide simulation of the following types of indirect fire units:
a) Artillery
b) Mortar
c) Close Air Support

ES-28. **Requirement**
EXCON shall determine the dispersion of indirect fire based on the number of firing artillery pieces, their dispersion pattern, and position relative to the target as defined by System Operator.

ES-29. **Requirement**
EXCON shall provide functions that enable System Operators to prepare and store targets for indirect fire for convenient activation of indirect fire engagements during the exercise.

ES-30. **Requirement**
EXCON shall provide functions that enable System Operators to define point, line, and area targets in the following ways:
a) Entering coordinates
b) Drawing on the interactive map

DRAFT

ES-31. **Requirement**
EXCON shall provide functions that enable System Operators to define indirect fire engagements, including the following configurable parameters:
a) Time of impact
b) Type of munition
c) Fuse
d) Number of shells
e) Rate of fire

ES-32. **Requirement**
EXCON shall simulate the effect of mortar munitions, including the following types:
a) 60 mm HE
b) 81 mm HE
c) 81 mm SMOKE
d) 81 mm ILLUMINATION
e) 120 mm HE
f) 120 mm STRIX
g) 120 mm SMOKE
h) 120 mm ILLUMINATION

ES-33. **Requirement**
EXCON shall simulate the effect of artillery munitions, including the following types:
a) 105 mm HE
b) 155 mm HE
c) 155 mm HEAT
d) 155 mm BONUS
e) 155 mm EXCALIBUR
f) 155 mm SMOKE

ES-34. **Requirement**
EXCON shall simulate the effect of rocket artillery munitions, including the following types:
a) 220 mm HE
b) 122 mm HE
c) 107 mm HE

ES-35. **Requirement**
EXCON shall simulate the effect of CAS munitions, including the following types:
a) Cluster bomb unit
b) General purpose bomb
c) Automatic cannon

DRAFT

d) Air-to-ground missile

ES-36. **Requirement**
EXCON shall simulate the effect of contact fuse, delayed fuse, and proximity fuse for all applicable munitions.

ES-37. **Requirement**
EXCON shall be capable of sending fire records to Players that are determined by EXCON to be affected by the indirect fire.

ES-38. **Requirement**
EXCON shall be able to receive fire orders for indirect fire from Fire Support Teams over the real equipment fire control networks and engage targets accordingly.

ES-39. **Requirement**
Fire records sent by EXCON shall appear to be sent by the Player that initiated the indirect engagement (i.e the applicable Forward Observer).

ES-40. **Requirement**
EXCON shall appear to behave as a firing unit towards Players that initiated the engagement, including responding automatically to communications.

ES-41. **Requirement**
System Operators shall be able to define and send fire records for indirect fire over WAN.

3.2.2.3.2 CBRN and TIM

Simulated chemical and nuclear contamination will be used in order to simulate CBRN attacks as well as Toxic Industrial Material (TIM) events.

ES-42. **Requirement**
EXCON shall provide simulation of nuclear and chemical contamination with a realistic distribution in space, time and intensity taking the following parameters into account:
a) Time
b) Type of contamination
c) Wind speed and direction
d) Temperature
e) Precipitation
f) Type of terrain
g) Height differences in the terrain

DRAFT

ES-43. **Requirement**
EXCON shall provide functions that enable System Operators to define points and areas on the interactive map that can be used to define the distribution of simulated contamination.

ES-44. **Requirement**
EXCON shall provide functions that enable System Operators to activate contamination areas both manually and by trigger.

ES-45. **Requirement**
EXCON shall be capable to send fire records to Players that are located within a contamination area.

ES-46. **Requirement**
Fire records for contamination sent by EXCON shall appear to be sent by the Player causing the contamination (e.g. simulated Player or Live player causing the secondary effect, TIM event).

ES-47. **Requirement**
Fire records for contamination shall include information about type and intensity of the contamination that can be used by Target Objects to determine the effect in target.

3.2.2.3.3 Mines and IED

INFO Mines simulated by EXCON will be used as a complement to the physical training mines provided by LMIS. Mines simulated by EXCON will interact with Players via WAN. For high credibility, it is important that simulated mines provide realistic stimuli to Trainees. Examples of important characteristics include the time needed to lay mines, the effect of mines, and efforts needed for clearing mines.

ES-48. **Requirement**
EXCON shall provide functions that enable System Operators to prepare and store minefields for convenient activation during the exercise.

ES-49. **Requirement**
EXCON shall provide functions that enable System Operators to create various types of minefields, including mine area and mine line.

ES-50. **Requirement**
EXCON shall provide functions that enable System Operators to define point, line, and areas for use as minefields in the following ways:
a) Entering coordinates
b) Drawing on the interactive map

DRAFT

ES-51. **Requirement**
EXCON shall enable System Operators to define the contents of minefields in the following ways:
a) Type of mine
b) Number of mines

ES-52. **Requirement**
EXCON shall simulate the effect of full width attack mines, including the following types:
a) Surface AT mine with shaped charge effect (‘Stridsvagnsmina 6’)
b) Surface AT mine with blast effect (‘Stridsvagnsmina 5’ with actuator ‘Mintändare16’)
c) Remotely delivered AT mine

ES-53. **Requirement**
EXCON shall simulate the effect of pressure switch mines, including the following types:
a) Surface AT mine with blast effect (‘Stridsvagnsmina 5’)
b) Remotely delivered AT mine with shaped charge effect

ES-54. **Requirement**
The arming time shall be in accordance with the corresponding real mine.

ES-55. **Requirement**
The criteria for actuation shall be in accordance with the corresponding real mine.

ES-56. **Requirement**
The effect of mine detonation be in accordance with the corresponding real mine.

ES-57. **Requirement**
EXCON shall send fire record to a Player that is determined to be affected by the detonated mine.

ES-58. **Requirement**
EXCON shall send information about the mine detonation event to Players that are within visible or aural detection range of mine detonation.

ES-59. **Requirement**
A detonated mine shall be the same as for the corresponding real mine.

ES-60. **Requirement**
Each mine shall, after detonation, remain inactive until activated by the System Operator.

DRAFT

ES-61. **Requirement**
EXCON shall enable System Operators to activate and deactivate mines.

ES-62. **Requirement**
EXCON shall provide functions that enable System Operators to clear mines including functions to clear complete minefield, part of minefield, and paths through minefields.

ES-63. **Requirement**
The simulation of mines provided by EXCON shall ensure that Players moving in cleared areas and on paths already passed by similar vehicles during the exercise do not actuate mines.

ES-64. **Requirement**
Fire records sent by EXCON shall appear to be sent by the Player that placed the mine.

ES-65. **Requirement**
The status and identification of minefields shall be visible to System Operators in the interactive map view.

ES-66. **Requirement**
EXCON shall provide simulation of mine clearing equipment that can be added as a function to Players.

ES-67. **Requirement**
EXCON shall simulate the clearing of mines, taking the following aspects in consideration when determining the result of the clearing:
a) Density of mines
b) Type of mine
c) Type of mine clearing equipment
d) Effect of detonated mine on the clearing equipment

ES-68. **Requirement**
EXCON shall provide functions that enable System Operators to clear mines including functions to clear complete minefield, part of minefield, and paths through minefields.

3.2.2.4 Target simulation

INFO No requirements identified.

DRAFT

3.2.2.5 Combat service support simulation

ES-69. **Requirement**
EXCON should be able to collect logistic status reports from C2-systems and compare them with logistic information in event reports.

ES-70. **Requirement**
EXCON should be able to present Field Engineering Reports in the interactive map.

3.2.2.6 Position and direction

INFO For general requirements see [1].

3.2.2.7 Association

INFO For general requirements see [1].

3.2.3 Effects representation capability

ES-71. **Requirement**
EXCON shall provide functions that enable System Operators to remote control any and all networked effects representations (e.g. visual and sound effects provided by EXCON) from any and all exercise control positions, including functions for:
a) Starting the effect
b) Stopping the effect
c) Adjusting the effects applicable for the respective effect type

ES-72. **Requirement**
EXCON shall provide functions that enable System Operators to activate any and all networked effects representations (e.g. visual and sound effects provided by EXCON) based on triggers.

3.2.4 Reporting capability

INFO For general requirements see [1].

3.2.5 Communication capability

ES-73. **Requirement**
EXCON shall enable System Operators (and Observer/Controllers) to communicate, using the WAN communication capability, with any and all System Operators (and Observer/Controllers) within the exercise.

DRAFT

3.2.6 Exercise control capability

3.2.6.1 System control

3.2.6.1.1 Start-up and Shut Down

ES-74. **Requirement**
EXCON shall be capable of running exercises within 10 minutes after start-up has been initialized. It can be assumed that all exercise equipment and materials are installed at intended positions.

ES-75. **Requirement**
EXCON shall be designed so that players can be added and removed in the exercise at any time before and during the exercise without causing any negative effect on the exercise.

ES-76. **Requirement**
EXCON shall be completely shut off within 20 minutes after shut down has been initialized without losing any recorded data.

ES-77. **Requirement**
EXCON shall monitor and present the current the operational status of instrumentation system components in the exercise.

ES-78. **Requirement**
EXCON shall warn System Operators when vital EXCON components stop functioning as intended.

ES-79. **Requirement**
EXCON shall enable System Operators to request status report from instrumentation system equipment.

ES-80. **Requirement**
EXCON should provide the capability to send status updates to Players that specifies which optical coding standard to be used in each exercise.

3.2.6.2 Exercise creation

3.2.6.2.1 Order of Battle

INFO Order of Battle (ORBAT) is defined as a description of command structure, organisation of units, players, and equipment in an exercise.

DRAFT

ES-81. **Requirement**
EXCON shall provide functions that enable System Operators to create ORBAT in the following ways:
a) Create a new ORBAT
b) Adapt an existing ORBAT

ES-82. **Requirement**
EXCON shall be capable of displaying a hierarchical overview of ORBAT containing the following information about each unit and Player:
a) Organisational structure
b) Command structure
c) Affiliation to side
d) Call sign
e) Type
f) Assignment
g) Associations
h) Id

ES-83. **Requirement**
EXCON shall provide functions that enable System Operators to define at least 6 (six) different sides within an exercise.

ES-84. **Requirement**
EXCON shall provide functions that enable System Operators to affiliate Players and units to any one side in the exercise.

ES-85. **Requirement**
EXCON shall provide functions that enable System Operators to assign each Player to any organisational unit in the exercise.

ES-86. **Requirement**
EXCON shall provide functions that enable System Operators to assign Players as commanders of units.

ES-87. **Requirement**
EXCON shall provide functions that enable System Operators to assign call signs to Players and units.

ES-88. **Requirement**
EXCON shall provide automated functions for assignment of call signs to subordinate units and Players.

DRAFT

ES-89. **Requirement**
EXCON shall provide functions that enable System Operators to create custom call signs.

ES-90. **Requirement**
EXCON shall provide functions that enable each Player to be provided a unique identification code for the exercise (this code will be used for unique identification of Players and associated Dynamic Objects).

ES-91. **Requirement**
EXCON shall be capable of displaying the associations between Dynamic Objects.

ES-92. **Requirement**
EXCON shall provide functions that enable System Operators to define the command structure within an organisation.

ES-93. **Requirement**
EXCON shall provide functions that enable System Operators to add and remove Players in an exercise at any time before and during an exercise without any noticeable interruption or negative effect on the exercise.

ES-94. **Requirement**
EXCON shall provide functions that enable System Operators to allocate each player to selected exercise.

ES-95. **Requirement**
EXCON shall provide functions that enables System Operators to control and monitor several concurrent exercise.

ES-96. **Requirement**
EXCON should provide functions that enable System Operators to configure exercises involving external simulations that are connected via HLA, see System Specification for interface requirements.

ES-97. **Requirement**
EXCON shall provide functions that enable System Operators to control Player status from the exercise control position via PNAN.

ES-98. **Requirement**
EXCON shall be designed so that System Operators are able to adjust the user interface to suit their needs, including the following adjustments:
a) Hide and show user interface components
b) Move and resize windows

DRAFT

ES-99. **Requirement**
EXCON shall provide functions that enable System Operators to send exercise control data to any and all System Operators in the exercise. Exercise control data includes ORBAT, text messages, map overlays.

ES-100. **Requirement**
EXCON shall provide functions that enable System Operators to define conditions that, when satisfied, automatically trigger the start of EXCON functions (including artillery, mines, send messages, set bookmark, send status updates commands to Players, start video recording…). Conditions available for selection shall include
a) Engagements
b) Player position
c) Player status change
d) Time

ES-101. **Requirement**
EXCON shall enable System Operators to trigger simulated events manually.

ES-102. **Requirement**
EXCON shall be capable of automatically triggering pre-planned simulated events based on conditions set by System Operators, including the following type of conditions:
a) Player entering areas
b) Player passing lines
c) Player reported events
d) Time

ES-103. **Requirement**
EXCON shall provide the capability to use geometrical shapes drawn by System Operators in the interactive map for automatic triggering of simulated events.

3.2.6.2.2 Interactive map view

ES-104. **Requirement**
The interactive map function shall be provided by the Carmenta Engine. License for Carmenta Engine will be provided by FMV.

ES-105. **Requirement**
EXCON shall provide the interactive map function at each exercise control position.

DRAFT

ES-106. **Requirement**
EXCON shall provide functions that enable System Operators to use overlays on the interactive map, including the following functions:
a) Create overlays
b) Create graphics, including, points, lines, and polygonal areas
c) Manipulate graphics, including move, rotate, resize, and delete graphics
d) Import overlays
e) Export overlays
f) Create tactical symbols

ES-107. **Requirement**
EXCON shall provide NATO tactical symbols and map symbols in accordance with STANAG 2019 App-6A Military Symbols for Land Based Systems [2].

ES-108. **Requirement**
EXCON shall be capable of displaying symbols representing aggregated units at several levels of aggregation, including individual Player, section, platoon, and company unit size, as selected by the System Operator.

3.2.6.2.3 Dynamic Object Control

INFO System Operators will use EXCON to control the status of Dynamic Objects. Status updates include changing simulated damage status, fuel, ammunition, and water supplies etc, as applicable for the respective Dynamic Object.

ES-109. **Requirement**
EXCON shall provide functions that enable System Operators to define initial settings for Dynamic Objects.

ES-110. **Requirement**
EXCON shall provide functions that enable System Operators to change the status of any and all Dynamic Objects.

ES-111. **Requirement**
EXCON shall provide the capability to update the status of Players via WAN.

ES-112. **Requirement**
EXCON shall provide the capability to update the status of Players via PNAN.

3.2.6.2.4 Data Management

INFO For the purpose of defining this requirement, the term ‘data’ in this paragraph represents captured data as well as created data.

DRAFT

ES-113. **Requirement**
EXCON shall provide the capability to manage data, including functions for:
a) saving data to a selected storage location
b) opening a saved data
c) closing open data with an option to save changes or not
d) opening data and saving it with a new name
e) opening a saved data, edit the data using any of the editing functions and then saving it with the changes
f) changing the name of saved data
g) organising data in a directory structure
h) exploring the data directory structure
i) create a short text description of the data (e.g. in ‘properties’) that can be viewed by moving the mouse pointer over the data item name in the directory structure
j) deleting, copying, and moving saved data
k) write protect data so that only user roles with the same or higher access rights can edit the data
l) protect directories so that only authorised user roles can manage the directory

ES-114. **Requirement**
EXCON shall provide the capability to create backup of data on external storage devices, see System Specification for interface requirements.

ES-115. **Requirement**
EXCON shall provide the capability to import ORBAT data from MS Excel compatible files.

ES-116. **Requirement**
EXCON shall provide the capability to import and use media files, including video and audio sequences, in commonly available standard formats

ES-117. **Requirement**
EXCON shall provide the capability to import and use data, including the following:
a) geographical data in standard formats, including Shapefile and DTED
b) infrastructure data (e.g. for buildings), in several standard commercially available formats, e.g. CAD, 3DS, SketchUp, OpenFlight

DRAFT

3.2.7 Exercise monitoring capability

3.2.7.1 Events and Status

INFO System Operators will use EXCON in order to maintain situational awareness of the exercise.

ES-118. **Requirement**
EXCON shall automatically maintain a record of all Players that are connected.

ES-119. **Requirement**
EXCON shall automatically capture reports sent by Players.

ES-120. **Requirement**
EXCON shall enable System Operators to request reports from Players.

ES-121. **Requirement**
EXCON shall be capable of capturing data from Players via PNAN.

ES-122. **Requirement**
EXCON shall be capable of capturing data from BT46 via field computer ‘BT46 Fältdator’.

ES-123. **Requirement**
EXCON shall be capable of capturing data from participating Dynamic Objects.

ES-124. **Requirement**
EXCON shall automatically provide captured data with time stamps that enable System Operators to retrieve events based on time.

ES-125. **Requirement**
EXCON shall correlate captured positioning and association data from available sources when establishing the Players position (e.g. determine that a soldier is inside a vehicle based on available information about the soldier’s position, the vehicle’s position and association between soldier and vehicle).

ES-126. **Requirement**
EXCON shall eliminate unrealistic movements when establishing the Players position.

ES-127. **Requirement**
EXCON shall display Players and Events in the interactive map view.

DRAFT

ES-128. **Requirement**
EXCON shall enable System Operators to select which Players that are displayed in the interactive map view.

ES-129. **Requirement**
EXCON shall provide a three dimensional view of the exercise area including presentation of Players and Events.

ES-130. **Requirement**
EXCON shall enable that all data and bookmarks, captured from an exercise are automatically time tagged using GNSS time and correlated by EXCON to enable retrieval of information about a certain event during AAR preparation.

ES-131. **Requirement**
EXCON shall display the current status of Dynamic Objects.

ES-132. **Requirement**
EXCON shall display the current status of Players.

ES-133. **Requirement**
EXCON shall display the current aggregated status of units.

ES-134. **Requirement**
EXCON shall display associations between Dynamic Objects.

ES-135. **Requirement**
EXCON shall provide the capability to automatically keep track of individual Dynamic Objects, Players and Units selected by the System Operator.

ES-136. **Requirement**
EXCON shall graphically display each engagement in on the interactive map, identifying the following:
a) Shooter
b) Target
c) Type of engagement

ES-137. **Requirement**
EXCON shall be capable of displaying all Dynamic Objects in the exercise graphically on the interactive map, providing the following real time information about each Dynamic Object:
a) Position
b) Status
c) Type
d) Identification

DRAFT

e) Affiliation

ES-138. **Requirement**
EXCON shall be capable of displaying a list of all Dynamic Objects in the exercise, providing the following real time information about each Dynamic Object:
a) Status
b) Type
c) Identification
d) Affiliation
e) Associations

ES-139. **Requirement**
EXCON shall be capable of displaying a current list of all Events in the exercise, providing the following information about each Event:
a) Type
b) Contents of the report
c) Who reported the event
d) Time

ES-140. **Requirement**
EXCON shall display the current status of data capture (e.g. started, stopped, progress, estimated remaining time, failure, etc.).

ES-141. **Requirement**
EXCON shall be capable of displaying the current azimuth and elevation of weapons.

ES-142. **Requirement**
EXCON shall be capable of displaying information about the current speed and direction of movement for Players.

3.2.7.2 Audio and Video

ES-143. **Requirement**
EXCON should be capable of starting video recording based on predefined trigger events.

ES-144. **Requirement**
EXCON shall be capable of capturing real time streaming video and audio from networked video cameras via WAN.

DRAFT

ES-145. **Requirement**
EXCON shall be capable of capturing video and audio from external video cameras.

ES-146. **Requirement**
EXCON shall provide functions that enable System Operators to control connected pan-tilt-zoom video cameras.

ES-147. **Requirement**
EXCON shall provide functions that enable System Operators to create still images from video during playback.

ES-148. **Requirement**
EXCON shall store still images created from video so that they are searchable by Operators using on any of the following properties: time, camera position.

ES-149. **Requirement**
EXCON should be capable of display the name, as defined by ORBAT, of Players visible in the video camera view.

ES-150. **Requirement**
EXCON shall provide functions that enable playback of video with and without audio.

3.2.7.3 C4I

3.2.7.3.1 Monitoring of C4I

ES-151. **Requirement**
EXCON shall enable configuration of which tactical radio networks that are monitored in the respective exercise.

ES-152. **Requirement**
EXCON shall enable configuration of which tactical radio networks that are recorded during the exercise.

ES-153. **Requirement**
EXCON shall enable simultaneous monitoring and recording of voice communication on at least twenty (20) separate tactical radio networks, including the following tactical radio networks: Platoon TacNet (Swedish: PlutL), Company TacNet (Swedish: KompL), and Inter/Intra Squad IGR networks from the Company CTC.

DRAFT

ES-154. **Requirement**
EXCON shall enable System Operators to start and stop the capturing of data from each tactical radio network.

ES-155. **Requirement**
EXCON shall enable System Operators to bookmark and note communication sequences for later retrieval and replay.

ES-156. **Requirement**
EXCON shall enable System Operators at any and all exercise control positions to find recorded communication sequences based on meta data, including bookmarks, time stamps and network name.

ES-157. **Requirement**
EXCON shall enable System Operators at any and all exercise control positions to replay all recorded radio communication.

ES-158. **Requirement**
EXCON shall be capable of capturing voice communication from participating radio communication systems.

ES-159. **Requirement**
EXCON shall be capable of capturing data communication from participating C2 systems.

ES-160. **Requirement**
EXCON shall provide functions that enable System Operators to monitor communications in real time.

ES-161. **Requirement**
EXCON shall provide functions that enable System Operators to playback recorded voice communications.

3.2.7.3.2 Role playing using C4I

ES-162. **Requirement**
EXCON should be capable of providing participating C2 systems with data representing the simulated situation.

ES-163. **Requirement**
EXCON should provide functions that enable System Operators to act as commanders in the exercise and send data to participating C2 systems.

DRAFT

ES-164. **Requirement**
EXCON should provide functions that enable System Operators to record and export video of the 3D view of the exercise area for the purpose of providing UAV imagery to commanders in the exercise.

3.2.8 Exercise evaluation capability

ES-165. **Requirement**
EXCON shall enable comparison of recorded performance data so that the result of training units can be benchmarked against the result of previous training GTETS and against the result of other training units.

ES-166. **Requirement**
GTETS will be used to support the validation of units using external validation tools. EXCON shall be capable of exporting performance data in a format allowing editing in external widespread commercially available programs

ES-167. **Requirement**
EXCON should provide functions that enable System Operators to define training objectives and evaluation criteria for exercises.

ES-168. **Requirement**
EXCON should provide functions for automatic evaluation of Trainees by comparing performance during training with evaluation criteria defined by the System Operator.

3.2.8.1 Recording & Storage

ES-169. **Requirement**
EXCON shall store any and all captured data for later retrieval.

ES-170. **Requirement**
EXCON shall store any and all created data for later retrieval.

ES-171. **Requirement**
EXCON shall be able to store data recorded during at least one week of large unit training according to the operational profile.

3.2.8.2 Performance Analysis

EXCON will be used by System Operators to analyse the performance of Trainees during an exercise.

DRAFT

3.2.8.2.1 Bookmarks

ES-172. **Requirement**
EXCON shall provide functions that enable System Operators to manually bookmark events during exercise and playback.

ES-173. **Requirement**
EXCON shall automatically bookmark events based on conditions defined by the System Operator (e.g. when a certain Player enters a certain area).

ES-174. **Requirement**
EXCON shall provide a function that automatically informs System Operators when Player enters an area defined by the System Operator.

ES-175. **Requirement**
EXCON shall enable start of replay from a selected bookmark.

ES-176. **Requirement**
EXCON shall enable System Operators to bookmark events for later retrieval and replay of recorded data.

ES-177. **Requirement**
EXCON shall enable System Operators to prepare logical conditions that will trigger EXCON to automatically create bookmarks for later retrieval and replay of recorded data.

ES-178. **Requirement**
EXCON shall provide functions that enable Observer/Controllers to make bookmarks and reports while mobile in the exercise area.

ES-179. **Requirement**
EXCON shall be capable of capturing reports and bookmarks made by Observer/Controllers.

ES-180. **Requirement**
EXCON shall provide templates for Observer/Controller reports.

3.2.8.2.2 Analysis of Events

ES-181. **Requirement**
EXCON shall provide functions that automatically measures and presents the elapsed time between events selected by the System Operator.

DRAFT

ES-182. **Requirement**
EXCON shall provide functions that provide System Operators with an overview of the course of events based on selections made by the System Operator.
Examples of use include analysis of course of action during medical evacuation, logistics, command and control, etc.

ES-183. **Requirement**
EXCON shall provide functions that enable System Operators to analyse and present differences between required performance and actual performance of Trainees.

ES-184. **Requirement**
EXCON shall provide functions that enable System Operators to analyse and present differences between actual situation, the situation perceived by the Trainee, and the correct situation.

3.2.8.2.3 Statistics

EXCON shall provide functions that enable System Operators to generate statistical reports from performance data stored by the EXCON, including statistics about engagement results and events.

3.2.8.2.4 Playback

ES-185. **Requirement**
EXCON shall provide functions that enable System Operators to conduct playback of exercises from recorded data.
Playback of recorded data provided by EXCON shall be synchronised in space and time to the resolution provided by time and position tagging during data capture.

ES-186. **Requirement**
EXCON shall provide the capability to search for recorded event data by time, position, call sign, id, and bookmark.

ES-187. **Requirement**
EXCON shall enable search of recorded radio communication by time, network and bookmark.

ES-188. **Requirement**
EXCON shall enable search of recorded video by time, camera position and bookmark.

DRAFT

ES-189. **Requirement**
EXCON shall be capable of displaying recorded data using a 3D visualisation of the exercise terrain, players and events.

3.2.8.2.5 Gunnery Performance

ES-190. **Requirement**
EXCON shall enable real time monitoring and playback of the gunnery performance of individual Players, including the following
a) Aiming procedure before fire
b) Aiming procedure after fire (for guided missiles)
c) Maximum deviation of flight path from line of sight (for guided missiles)
d) Aiming error, horizontal and vertical
e) Hit points in relation to the target
f) Used laser distance
g) Ammunition type
h) Time between shots

ES-191. **Requirement**
EXCON shall enable graphical presentation of gunnery events during engagement procedure in relation to the target silhouette, including the following
a) Hit points
b) Aiming points
c) Laser aiming points

3.2.8.3 After Action Review

3.2.8.3.1 Compilation of AAR

ES-192. **Requirement**
EXCON shall enable System Operators to compile multimedia presentations for the purpose of briefings and after action review.

ES-193. **Requirement**
EXCON shall provide functions that enable System Operators to select and incorporate any and all of the following data in multimedia presentations:
a) recorded data from the exercise
b) images
c) documents
d) video and audio

DRAFT

ES-194. **Requirement**
After the completion of exercises, System Operator shall be able to begin battalion level AAR within 120 minutes.

ES-195. **Requirement**
After the completion of exercises, System Operator shall be able to begin company level AAR within 60 minutes.

ES-196. **Requirement**
After the completion of exercises, System Operator shall be able to begin platoon level AAR within 10 minutes.

ES-197. **Requirement**
EXCON shall enable editing of video recordings, including functions for:
a) adding voiceover
b) adding graphics, text and subtitles
c) structuring and assembling recordings
d) inserting recordings
e) deleting recordings

ES-198. **Requirement**
a) EXCON shall enable editing of voice recordings, including functions for
b) structuring and assembling recordings
c) inserting recordings
d) deleting recordings

3.2.8.3.2 Performance reports

ES-199. **Requirement**
EXCON shall provide functions that enable the compilation of performance reports for use in after action review.

ES-200. **Requirement**
EXCON shall provide templates for performance reports suitable for after action review of tactical engagement training exercises, including templates for battalion, company, platoon, and section level.

ES-201. **Requirement**
EXCON shall enable System Operators to create new and edit existing performance report templates.

DRAFT

ES-202. **Requirement**
EXCON shall provide templates for performance reports suitable for after action review gunnery training exercises, including templates for platoon, section, crew, and individual level.

ES-203. **Requirement**
EXCON shall provide functions that enable System Operators to export AAR presentations to files that are compatible with the Microsoft Office Suite.

3.2.8.3.3 Presentation of AAR

INFO In addition to presenting AAR using the functions provided by EXCON, Trainees will view AAR at the home base using FM standard office computers.

ES-204. **Requirement**
EXCON shall enable System Operators to present a mix of media during briefings and AAR, including
a) playback of communications, audio and video recordings from the exercise
b) interactive map view, including playback of recorded data
c) other audio and video files stored by EXCON
d) Microsoft Office and Open Office documents

ES-205. **Requirement**
EXCON shall be designed so that presentation of AAR is possible using SwAF computer hardware that is independent ('stand-alone') from EXCON.

ES-206. **Requirement**
EXCON shall be designed so that after actions review functions can be used in parallel with exercises without any negative effect on the exercise.
Printing capability provided by EXCON shall enable printing of colour images and documents up to and including A3 size, including
a) maps
b) high resolution photo
c) screen shots
d) office type documents

3.3 System external interface requirements

3.3.1 Interface identification and diagrams

INFO See the System Specification for interface diagrams.

DRAFT

3.3.2 Interface A (Laser)

ES-207. **Requirement**
The optical interface of O/C equipment shall be in accordance with Interface A as defined in the System Specification [1].

3.3.3 Interface B (PNAN)

ES-208. **Requirement**
Portable EXCON shall interface with PNAN via Interface B as defined in the System Specification [1].

ES-209. **Requirement**
O/C equipment shall interface with PNAN via Interface B as defined in the System Specification [1].

3.3.4 Interface C (WAN)

INFO No requirements identified.

3.3.5 Interface D (BT46 serial)

INFO No requirements identified.

3.3.6 Interface E (Tactical radio)

INFO No requirements identified.

3.3.7 Interface F (Serial)

ES-210. **Requirement**
Platoon CTC shall interface with Carried WAN via Interface F as defined in the System Specification [1].

ES-211. **Requirement**
Portable CTC client shall interface with Carried WAN via Interface F as defined in the System Specification [1].

ES-212. **Requirement**
Handheld CTC shall interface with Carried WAN via Interface F as defined in the System Specification [1].

DRAFT

3.3.8 Interface G (LAN)

ES-213. **Requirement**
Company CTC shall interface with Infrastructure WAN via Interface G as defined in the System Specification [1].

ES-214. **Requirement**
Platoon CTC and Portable CTC clients shall interface with Company CTC via Interface G as defined in the System Specification [1].

3.3.9 Interface H (HLA)

ES-215. **Requirement**
Company CTC shall interface with external HLA compliant federations via Interface H as defined in the System Specification [1].

ES-216. **Requirement**
Company CTC shall be capable of exchanging position and status of objects with UOTS via Interface H as defined in the System Specification [1].

3.3.10 Interface I (Audio/Video)

ES-217. **Requirement**
Platoon CTC shall be capable of presenting high definition quality digital audio, video and images on Portable Presentation equipment via commercially available interfaces with broad user base (e.g. HDMI).

3.3.11 Interface J (O/C communication)

ES-218. **Requirement**
O/C Equipment shall interface with O/C Communications equipment via Interface J as defined in the System Specification [1].

3.4 System internal interface requirements

ES-219. **Requirement**
The requirements defined in paragraph 3.4 System internal interface requirements in the System Specification [1] shall apply to EXCON.

DRAFT

3.5 System internal data requirements

ES-220. **Requirement**
The requirements defined in Paragraph 3.5 System internal data requirements in the System Specification [1] shall apply to EXCON.

ES-221. **Requirement**
EXCON shall be designed so that the user role (‘log in’) determines which capability is available and which access to data is granted to the user at each user interface.

3.6 Adaptation requirements

ES-222. **Requirement**
The requirements defined in Paragraph 3.6 Adaptation requirements in the System Specification [1] shall apply to EXCON.

3.7 Safety requirements

ES-223. **Requirement**
The requirements defined in Paragraph 3.7 Safety requirements in the System Specification [1] shall apply to EXCON.

3.8 Security and privacy requirements

ES-224. **Requirement**
The requirements defined in paragraph 3.8 Security and privacy requirements in the System Specification [1] shall apply to EXCON.

3.9 System environment requirements

ES-225. **Requirement**
The requirements defined in paragraph 3.9 System environment requirements in the System Specification [1] shall apply to EXCON.

3.10 Computer resource requirements

3.10.1 Computer hardware requirements

ES-226. **Requirement**
The requirements defined in paragraph 3.10.1 Computer hardware requirements in the System Specification [1] shall apply to EXCON.

DRAFT

3.10.2 Computer hardware resource utilization requirements

ES-227. **Requirement**
The requirements defined in paragraph 3.10.2 Computer hardware resource utilization requirements in the System Specification [1] shall apply to EXCON.

ES-228. **Requirement**
EXCON shall be designed so that software applications provided by FMV and SwAF including those listed below can be used on exercise control computers in parallel with on-going exercises without any noticeable degradation of System performance:
a) MARTA/ISAM
b) RAMtr@ck
c) MS Office

3.10.3 Computer software requirements

ES-229. **Requirement**
The requirements defined in paragraph 3.10.3 Computer software requirements in the System Specification [1] shall apply to EXCON.

3.11 System quality factors

ES-230. **Requirement**
The requirements defined in paragraph 3.11 System quality factors in the System Specification [1] shall apply to EXCON.

3.11.1 Reliability, Maintainability, and Availability

INFO No additional requirements identified.

3.11.2 Testability

ES-231. **Requirement**
Diagnostics results, as well as any prompts for interactive testing shall be displayed by EXCON.

3.12 Design and construction constraints

INFO This paragraph specifies requirements that constrain the design and construction of EXCON system, and which are the result of design decisions made by FMV. It also contains requirements pertaining to the architecture of the System. The EXCON system, will be subject to modification, alteration, and expansion during

the life cycle and thus, there is a need for the System to be flexible and allow easy insertion of new functions.

3.12.1 Architecture requirements

ES-232. **Requirement**
The requirements defined in paragraph 3.12.1 Architecture requirements in the System Specification [1] shall apply to EXCON.

3.12.2 Design standards

ES-233. **Requirement**
The requirements defined in paragraph 3.12.2 Design standards in the System Specification [1] shall apply to EXCON.

3.12.3 Physical characteristics

ES-234. **Requirement**
Platoon CTC shall include a carrying system that enable an Observer/Controller moving on foot in the exercise area to carry the equipment efficiently and ergonomically.

ES-235. **Requirement**
Platoon CTC shall have a total combined weight of less than 5 kg, including the carrying system.

3.12.4 Materials

ES-236. **Requirement**
The requirements defined in paragraph 3.12.4 Materials in the System Specification [1] shall apply to EXCON.

3.12.5 Flexibility and expandability

ES-237. **Requirement**
The requirements defined in paragraph 3.12.5 Flexibility and expandability in the System Specification [1] shall apply to EXCON.

3.12.6 Power supply

ES-238. **Requirement**
The requirements defined in Paragraph 3.12.6 Power supply in the System Specification [1] shall apply to EXCON.

DRAFT

ES-239. **Requirement**
It shall be possible to use the Platoon CTC without external power supply.

ES-240. **Requirement**
It shall be possible to use the Platoon CTC with external power supply.

ES-241. **Requirement**
It shall be possible to use the Portable CTC and Handheld CTC without external power supply.

ES-242. **Requirement**
Company CTC shall be design for external power supply available in the M5086-102011 PHV 9,7 STA/T trailer.

3.12.7 Marking

ES-243. **Requirement**
The requirements defined in paragraph 3.12.7 Marking in the System Specification [1] shall apply to EXCON.

3.12.8 Other design and construction requirements

ES-244. **Requirement**
The requirements defined in paragraph 3.12.8 Other design and construction requirements in the System Specification [1] shall apply to EXCON.

3.13 Personnel-related requirements

ES-245. **Requirement**
The requirements defined in paragraph 3.13 Personnel-related requirements in the System Specification [1] shall apply to EXCON.

ES-246. **Requirement**
The design of EXCON shall be in accordance with Swedish legislation, including the following
a) AFS 1998:5 – Work with Display Screen Equipment [3]
b) AFS 2000:42 – Workplace Design [4]
c) AFS 2005:16 – Buller [5]

ES-247. **Requirement**
Information corresponding to the scope and depth of the user manual shall be integrated in EXCON for the purpose of built-in help that exhibit the following characteristics:
a) Formatted for screen presentation

DRAFT

b) Formatted for printing
c) Available for display and printing in each workstation
d) Searchable to an extent corresponding minimum to an indexed .pdf file

3.14 Training-related requirements

ES-248. **Requirement**
The requirements defined in paragraph 3.14 Training-related requirements in the System Specification [1] shall apply to EXCON.

3.15 Logistics-related requirements

ES-249. **Requirement**
The requirements defined in paragraph 3.15 Logistics-related requirements in the System Specification [1] shall apply to EXCON.

ES-250. **Requirement**
EXCON shall record and store BIT results reported from GTETS equipment via WAN and PNAN.

ES-251. **Requirement**
EXCON shall enable System Operators to sort, search and view the BIT results reported from GTETS equipment (e.g. an ‘error log’).

ES-252. **Requirement**
EXCON should provide functions that enable System Operators to plan exercises, including allocation of assets, such as equipment and personnel that are required for exercises.

3.16 Other requirements

3.16.1 Documentation

ES-253. **Requirement**
The requirements defined in Paragraph 3.16.1 Documentation in the System Specification [1] shall apply to EXCON.

3.17 Packaging requirements

ES-254. **Requirement**
The requirements defined in Paragraph 3.17 Packaging requirements in the System Specification [1] shall apply to EXCON.

DRAFT

3.18 Precedence and criticality of requirements

ES-255. **Requirement**
The requirements defined in Paragraph 3.18 Precedence and criticality of requirements in the System Specification [1] shall apply to EXCON.

4 Qualification provisions

ES-256. **Requirement**
The requirements defined in Section 4 in the System Specification [1] shall apply to EXCON.

5 Requirements traceability

ES-257. **Requirement**
The requirements defined in Section 5 in the System Specification [1] shall apply to EXCON.

6 Notes

6.1 Acronyms and abbreviations

INFO See paragraph 6.1 Acronyms and definitions in the System Specification [1].

DRAFT